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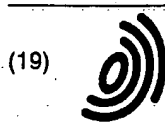
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### (54) Signalling method and system for packet network

Signalierungsverfahren und -system für Paketnetz

Méthode et dispositif de signalisation pour réseau à paquets

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- **INTERNATIONAL SWITCHING SYMPOSIUM**  
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**virtual circuit routing for B-ISDN networks"**

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## Description

[0001] This invention relates to a signaling system for a connection oriented packet network, and more particularly to a high speed connection setup/release signaling system.

[0002] Conventionally, the controlling procedure of connection setup/release between a source terminal and a destination terminal on a connection oriented packet network, that is, a signaling system, is constituted in order to accommodate a connection oriented terminal of a low function such as a telephone set. Accordingly, a large number of complex signaling messages to be communicated is complicated in processing. Consequently, such a signaling system is not suitable for high speed connection setup. When a connectionless terminal such as a computer is accommodated while using the signaling procedure as is, the connection setup delay time causes a serious problem in responsive applications.

[0003] A complicated controlling procedure is disclosed in "Draft Text for Q.93B", pp.1-72, which is a draft for standardization from the Working Party XIV/6 in Study Group XI of CCITT held in Geneva June 22 to 26, 1992.

[0004] In the draft for standardization, it is determined that signaling is performed by the exchange of messages, including six messages including SETUP for establishing connection, three messages including Disconnect for cancelling connection, and three messages including Status as other messages. The structure of the messages includes common portions including a protocol identifier, a call number and a type of message, and special information factors for the individual messages.

[0005] In the conventional signaling system, since a virtual channel (VC) is setup and released each time an application, packet transmission or burst transmission is started and ended, when an application is started and ended frequently like an interactive connectionless packet, the time required to connect and disconnect the VC becomes longer than the time during which data are transferred. In particular in the communication of a packet to the same destination, the VC to the same destination must be setup/release frequently.

[0006] Information factors of the setup message for establishing connection in Q.93B employ, in order to designate the called party to be connected, a traffic descriptor for a signal bandwidth, necessary for communication using a called party number and a called party subaddress. Since each exchange can only perform signaling for a hop-by-hop routing wherein it examines the called party number and the traffic descriptor in a received setup message to determine a certain next route having a necessary signal bandwidth and performs, after arriving at the object of the called party address, signaling with the called party subaddress, when a plurality of stages of switches are involved, much time is required for processing of routing selection at each of the switching systems. Consequently, there is a drawback in that

the end-to-end VC-setup time is long.

[0007] Further, in Q.93B, since a terminal performs, when it is in a connection setup phase, acquisition of a VC for transmission and acquisition of an end-to-end communication route by way of communication of the six messages including Setup, the processing delay time and the propagation delay time cannot be ignored even when a small amount of data is communicated.

[0008] Accordingly, in order to achieve setup signaling quickly, not the countermeasure wherein a VC is allocated on demand by the switching system for each transmission of a packet, but signaling wherein the terminal itself has some VCI(VC Identifier) initially and can select a VC without interaction with the switching system is required.

[0009] From EP-A2-0496390 a connection hold control system is known. The connection hold control system is adapted to a data communication system in which a data communication is alternately made between a first terminal and a second terminal and between the first terminal and a third terminal, where each of the first through third terminals is coupled to a communication network via a terminal adapter. The connection hold control system includes a hold part, provided within a first terminal adapter which is coupled to the first terminal, for holding a first channel which connects the first and second terminals via the communication network and the terminal adapters after a data communication from the first terminal to the second terminal ends, and a connect part, provided within the first terminal adapter, for connecting the first and second terminals via the first channel if a data communication from the first terminal to the third terminal via a second channel ends within a predetermined time after the data communication from the first terminal to the second terminal ends.

[0010] It is an object of the present invention to provide a high speed signaling method for a connection oriented packet network which achieves an increase in speed upon transmission by allocating an unused VC to a transmission terminal in advance. The object is achieved by the features of claim 1 or 2.

[0011] It is a further object of the present invention to provide a signaling system for a packet network for realizing the method of the invention. The object is achieved by the features of claim 3.

Fig. 1 is a block diagram of a first embodiment of a signaling system for the packet network;

Fig. 2 is a sequence chart of the signaling system in the system shown in Fig. 1;

Fig. 3 is a block diagram of a second embodiment of a signaling system for the packet network;

Fig. 4 is a diagrammatic view illustrating a method of representing a source route of the signaling packet shown in Fig. 3; and

Fig. 5 is a block diagram of an embodiment of a signaling system for the packet network of the present invention.

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[0012] In the following, the present invention is described in detail with reference to the drawings. First, a signaling system for connection and disconnection of a virtual channel (VC) with less overhead procedure without a connecting of permanent virtual channel (PVC) is described with reference to its block diagram and sequence chart. Second, another signaling system which reduces route selection processing is described with reference to its block diagram. Third, a further signaling system in which a terminal determines free VCs is described with reference to its block diagram. Finally, an inventive system wherein the signaling system which determines free VCs and the signaling system which reduces the route selection processing are combined with each other is described.

[0013] Fig. 1 is a block diagram showing a first embodiment of a signaling system for a packet network to which the first signaling method for the packet network is applied.

[0014] Each terminal 100 includes virtual channel (VC) timers 112, signal bandwidth timers 111 for dynamically varying the signal bandwidth held on VC and signal bandwidth table 102, packet transmission control section 110, and signaling transmission section 101.

[0015] Separately, packet switch 150 includes packet exchange section 151, and signaling handler 152.

[0016] The signaling system of the present embodiment adopts the following controlling procedure in Fig. 1.

[0017] When terminal 100 transmits a packet, packet transmission control section 110 delivers a request for transmission of the packet to signaling transmission section 101. Signaling transmission section 101 refers to VC and signal bandwidth table 102 and performs one of operations (a1), (b1), or (c1) in response to the condition of the table.

(a1) If a VC corresponding to the called party address and a signal bandwidth necessary for communication are written in table 102, the packet is transmitted through the VC.

(b1) If a corresponding VC is held but a signal bandwidth necessary for communication is not provided in table 102, an allocation request for the signal bandwidth is delivered to packet switching system (packet switch) 150 in accordance with the conventional signaling method. In packet switch 150, packet exchange section 151 detects that the packet is a signaling packet and delivers the packet to signaling handler 152. Signaling handler 152 reallocates the requested amount of signal bandwidth in the VC between terminal 100 and packet switch 150 and returns its reply to signaling transmission section 101 by way of packet exchange section 151. In response to the reply, signaling transmission section 101 describes the corresponding relationship between the VC and the signal bandwidth into VC & signal bandwidth table 102. After completion of

the description, packet transmission control section 110 transmits the packet to the called party through the allocated VC to packet switch 150.

(c1) If no corresponding VC and no signal bandwidth necessary for communication remain in table 102, an allocation request (signalling packet) for a VC with the necessary signal bandwidth is delivered to packet switch 150 in accordance with a signaling method similar to that in operation (b1), and signaling handler 152 in packet switch 150 reallocates a free VC with the necessary signal bandwidth in the VC between terminal 100 and packet switch 150. Then, the corresponding relationship of the called party address to the thus allocated VC and the signal bandwidth is described into VC & signal bandwidth table 102. After completion of the description, packet transmission control section 110 transmits the packet to the called party through the allocated VC to packet switch 150.

[0018] Further, table 102 has VC timer 112 and signal bandwidth timer 111 for each destination address and resets and restarts both timers for each transmission of a packet. Accordingly, the values of both timers represent intervals from the end of transmission of the last packet.

[0019] When an interval passes a first predetermined time according to signal bandwidth timer 111, signaling transmission section 101 starts to deliver a request to decrease the signal bandwidth to packet switch 150. Signaling handler 152 in packet switch 150 reallocates the shorter signal bandwidth and rewrites the allocated amount of VC & signal bandwidth table 102 together with a reply to signaling control section 101. When a predetermined limit of time has passed by signal bandwidth timer 111, signaling transmission section 101 delivers a request to reduce the bandwidth to 0 to packet switch 150, and the allocated signal bandwidth amount of VC & signal band table 102 is re-written to zero by way of a procedure similar to that described above.

[0020] Separately, in this instance, since VC timer 112 is set longer than signal bandwidth timer 111, even after signal bandwidth timer 111 passes the predetermined limit of time, the VC remains connected. When further time passes until the predetermined limit of VC timer 112, signaling transmission section 101 delivers a request to disconnect the VC (release packet) to packet switch 150, and consequently, the corresponding VC and the signal bandwidth are deleted from VC & signal bandwidth table 102 and the VC is disconnected by way of a procedure similar to that described above.

[0021] Accordingly, when communication of an application having the same destination address or the same service is resumed, one of the signaling methods (a2), (b2), or (c2) is performed in accordance with the timer values of VC timer 112 and signal bandwidth timer 111.

(a2) When both VC timer 112 and signal bandwidth

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timer 111 count the time without reducing the signal bandwidth, the held VC should be used to start communication without signaling. If no signal bandwidth necessary for the application is provided, signaling is performed to only request a signal bandwidth in accordance with signaling method (b1) described above.

(b2) If VC timer 112 is on before the predetermined limit of time but the necessary signal bandwidth is less than the required signal bandwidth, signaling is performed by requesting only the signal bandwidth in accordance with signaling method (b1) described above.

(c2) When both VC timer 112 and signal bandwidth timer 111 pass the predetermined limit of time, signaling is performed to request both a VC and a signal bandwidth in accordance with signaling method (c1) described above.

**[0022]** While the signaling procedure between terminal 100 and packet switch 150 described above with reference to Fig. 1 relates to Fig. 2 which sequentially illustrates signaling between two packet switches together with signaling between a terminal and a packet switch. Fig. 2 shows an example wherein a VC and a signal bandwidth are not yet allocated to a called party address.

**[0023]** When a packet is to be transmitted as shown at step 201, since no VC with the required signal bandwidth to the called party address is detected in the VC & signal bandwidth table, a signaling packet is delivered from terminal A to packet switch X in accordance with the system shown in Fig. 1.

**[0024]** Data transmission is performed as shown at step 202 through the VC and the signal bandwidth assigned by the conventional signaling method wherein a routing table search is performed in a hop-by-hop mode at packet switches X and Y according to the signaling packet. After data transmission at step 202 is completed, data transmission can be performed without signaling as seen from step 203 before the time limit of both the VC timer and the signal bandwidth timer. When the signal bandwidth timer has passed the time limit, signaling to request only a signal bandwidth is performed in a hop-by-hop mode as shown at step 204, and then data transmission is performed as shown at step 205. When both the VC timer and the signal bandwidth timer have passed their time limits, terminal A transmits a release packet to packet switch X requesting release of the VC as shown at step 206. In this manner, according to the present signaling system, neither the VC nor the signal bandwidth is released immediately after communication is completed but is held for a short period in order to reduce the overhead of signalling as much as possible.

**[0025]** Fig. 3 is a block diagram showing a second embodiment of a signaling system for a packet network to which the second signaling method for the packet network is applied. Describing operation of the signaling

system of the present embodiment, when a route is searched upon signaling, a physical port number is designated directly without searching a route based on the called party address, while allocation of a VC and a signal bandwidth at each link is based on the same controlling procedure as in the conventional hop-by-hop signaling system. The routing procedure in the present signaling system is concretely performed as follows referring to Fig. 3.

**[0026]** When terminal 300 transmitting a packet to terminal 303 having a called party address of IP1 is described, terminal 300 searches VC and routing information table 301 and performs one of operations (a), (b), or (c) in response to the content of the table.

(a) If a VC corresponding to called party address IP1 is written in VC & routing information table 301, this signifies that a VC has already been set to the called party, and a packet is transmitted through the VC.

(b) If no VC corresponding to the called party address and no routing information are written in table 301, hop-by-hop routing based on the conventional signaling method is performed to set a VC with the required signal bandwidth for each link between the terminal and a packet switch and between packet switches, and simultaneously, a reply information (linkage information of output port information) of ports of packet switches 350, 353, and 356 on a route from terminal 300 to terminal 303, the route which passes (for example, port 1 (352), port 3 (353), and port 2 (358)) is informed to terminal 300 so that the information is written into the routing information area of VC & routing information table 301. After completion of the writing, terminal 300 transmits the packet to terminal 303 through the VC allocated. Information of which ports of each packet switch on the route are connected can be obtained by a plurality of methods. For example, a method wherein signaling is performed, upon hop-by-hop signaling, adding output port information to the original signaling information and notifying the routing information to terminal 300 from destination terminal 303, and another method wherein, when a confirmation response is received from each relay packet switch to terminal 300, all output port information is included.

(c) If no VC corresponding to the called party address is written but routing information is written in VC & routing information table 301, route information is designated at a high speed by sending out signaling packet 310 including a setup message for signaling. Signaling packet 310, including the setup message for signaling such as HOP counter 320 and linkage information 321 (source routing information) which has been acquired as described in (b) above, successively links output port information of the relay switches. Terminal 300 sends out

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signaling packet 310 of a signaling message wherein the value of HOP counter 320 is set to 1 and the route information written in table 301 is placed in the section denoted at 321. Upon receiving the message, switch 350 recognizes that the first route is port 1 (352) which is indicated by HOP counter value 1 in the message of signaling packet 310 and represents the first port number from the right. Simultaneously, the HOP counter value of message 310 add one, and transfer signaling packet 311 is transferred from output port 352 of packet switch 350. Similarly, it is known to switch 353 that, from HOP counter value 2 of message 311, the next route is port 2 (355) of the second output port number of 3 from the right, and it is known to switch 356 that the last route is port 358 of the third port number of 2 from the right. Thus, each of packet switches 353 and 356 allocates a VC which requires a signal bandwidth for each route. After completion of the signaling described above, terminal 300 transmits a packet through the VC allocated to terminal 303.

[0027] In this instance, the following three techniques are available to place the source routing information in a signaling packet, including a method wherein a HOP counter in which the number of passed packet switches is recorded and port numbers interconnecting route information are placed as seen from format 401 in FIG. 4 (various positions may be possible for the HOP counter and the route information), another method wherein both a switch number and a port number are linked as seen from format 402, and a further method wherein port numbers are rotated each for passage of packet switches so that an output port may always be positioned at a fixed position in the link list as seen from format 403.

[0028] Further, the routing information in table 301 has routing information timer 302 for each destination address, and each time a packet to a particular called party address is dialed, the routing information timer for the called party address is reset and restarted. Accordingly, the value of the timer represents an interval of time which passes after the end of a packet transmission. When routing information timer 302 exceeds its predetermined time, only the routing information written on table 301 is erased.

[0029] Accordingly, when routing information is not available, conventional signaling is performed and routing information is simultaneously acquired, but when routing information is available, the routing information can be allocated immediately by source routing.

[0030] Fig. 5 is a block constructive view showing an embodiment of the signaling system for a packet network to which the signaling method for the packet network of the present invention is applied. Describing operation of the signaling system of the present embodiment, a free VC is allocated to a terminal and a packet switch in advance so that a signaling packet can set a VC by selecting a free VC. Consequently, a packet can

be sent out immediately after the signaling packet is sent out. The route control in the signaling system of the present embodiment concretely follows the following procedure shown by the arrows in Fig. 5. Free VCs at the output ports of packet switch 550 are allocated as input ports in advance (when the other party of the output port is a terminal, a free VC at the output port of the packet switch is used), and the output port number and the free VC at the output port are written for high speed mode signaling in free VC table 553 as an output port. Separately, also on the terminal 500 side, unused VCs of the links to input port 520 of switch 550 are allocated and written into output port Free VC table 502 for a high speed mode.

[0031] When terminal 500 transmits a packet, the following two controlling procedures are executed depending on the content of VC and mode table 501.

(a) When a VC to a called party address (for example, IP1 to IP3) exists in VC and mode table 501, this signifies that a VC has already been set, and a packet is transmitted without signaling.

(b) When a VC to the called party address is not present in VC and mode table 501, an arbitrary VC is acquired from Free VC table 502 for a high speed mode and signaling packet 510 is transmitted. A data packet may be transmitted simultaneously. Signaling packet 510 includes VC field 511 into which a VC identifier allocated to the terminal is arbitrarily placed and destination terminal address 512. Packet switch 550 compares VC field 511 in received signaling packet 510 with header translator table 552, and when it is confirmed that the mode field represents a high speed mode (quick) and the port number on the output port side and the VC corresponding to it are not yet decided, packet switch 550 interprets that the packet is a signaling packet. In the header translator table, mode information as to whether the mode is a high speed mode (quick) or an ordinary signaling mode, information of VC identifiers (VCIs) and information of output port numbers and VCs at the port numbers are written as information of the output ports. When a signaling packet is received, switch 550 refers to destination address 512 of the signaling packet to determine to which port it should output, and arbitrarily selects a free VC for a high speed mode of the output port from output port Free VC table 553 for an output port. Simultaneously, the relationship between the port number (1) of the output and the VCI (45) corresponding to the VCI (5) of the input port of header translator table 552 is rewritten. Thereafter, the thus selected VCI (45) is written into VCI field 514 to make transfer signaling packet 513, and transfer signaling packet 513 is outputted from output port 521.

[0032] In this instance, the VC used is deleted from

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high speed mode free VC table 502 on the terminal side and from output port free VC table 553.

[0033] Here, as a technique of discriminating whether a packet is a signaling packet or not, a method wherein a flag representing whether the packet is a data packet or a signaling packet is placed in advance in the header of the packet is available.

[0034] When a VC is released after communication is completed or a timer for each destination address counts the predetermined limit of time after it is reset and restarted for each packet transmission, the value of the mode of VC and mode table 501 is referred to, and if the mode is a high speed mode (quick), the VC is deleted from table 501 but is added to high speed mode free VC table 502. When a signaling packet to release the VC is received, the corresponding portions of the output port and the VCI of header translator table 552 are deleted at input port 520 on the switch 550 side while the port number and the VC are added to output port free VC table 553. The procedure for transferring the signaling packet for releasing the VC by a packet switch is the same as the procedure for setting up the VC.

[0035] Signaling set forth in claim 2 is signaling wherein routing information is used in place of the network address information set forth in claim 1. Routing information to a called party address is further included in VC and mode table 501 shown in Fig. 5 and a timer is prepared for the routing information. When a packet is transmitted, inputted called party address 512 is converted into routing information to effect high speed signaling. When signaling packet 510 having routing information is received, high speed mode signaling handler 551 is required only to select a written output port when an output port should be discriminated. Consequently, routing for a signaling packet to an output port can be achieved at a high speed. In signaling with a called party address included in signaling packet 510, the present technique is very simple in processing compared with the alternative technique wherein, upon routing for a signaling packet, each packet switch determines an output port to be routed based on a routing table provided in advance in the switch. And accordingly, hardware construction can be realized readily and is suitable for high speed operation.

#### Claims

1. A signaling method for VC connection setup/release on a connection oriented packet network in which each terminal acquires a virtual channel (VC) to transmit a packet to a packet switching system and said packet switching system sets up a virtual channel having a signal bandwidth corresponding to the request for transmission of the packet and notifies the virtual channel identifier to the terminal, said signaling method being characterized by the steps of:

allocating, at said packet switching system, to an input port (520) of said packet switch (550), a number of free virtual channels (VC) for each output port (521) as high speed mode virtual channels;

allocating, at each terminal, free virtual channels to the input port of said packet switching system as a high speed mode virtual channel; selecting, when a terminal tries to send a packet, a virtual channel applied as the high speed mode virtual channel instead of acquiring it from the switching system and performing signaling with the specific virtual channel number of the high speed mode virtual channel and a called party address (512) on a signaling packet (510) to said packet switching system; discriminating, in the packet switching system, an output port according to the called-party address of the received signaling packet, and allocating an appropriate virtual channel and forwarding the packet to the output port; and thereafter renewing the virtual channels relationship table between input and output ports.

2. A signaling method for a connection oriented packet network as claimed in claim 1, wherein the called party address to be placed in the signaling packet is replaced with the source routing path, which shows the path from the source terminal to the destination terminal by performing Rep-by-hop routing using the address of a called party terminal included in the signaling from the terminal.

3. A signaling system for VC connection setup/release on a connection oriented packet network in which each terminal acquires a virtual channel (VC) to transmit a packet to a packet switching system and said packet switching system sets up a virtual channel having a signal bandwidth corresponding to the request for transmission of the packet and notifying the virtual channel identifier to the terminal, the signaling system is characterized in that it comprises:

said packet switching system including:  
means for renewably allocating, to an input port of a packet switching system, some free virtual channels for each output port as high speed mode virtual channels;

a free virtual channel table (502) which is existing on each input port for a high speed mode where the output port number and the free virtual channels allocated to the output port are registered for high speed mode signaling;  
a header translator table (552) for indicating mode information representative of whether information received at the input port of said packet switching system is a high speed mode

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or an ordinary signaling mode, information representative of a virtual channel identifier, an output port number, and output port information as virtual channel identifier information at the output port number;

each terminal including;

a virtual channel and mode table (501) indicating called party addresses, virtual channels corresponding to the addresses and held for a predetermined period of time after the end of the transmission through the virtual channel;

a free virtual channel table (502) for a high speed mode virtual channel in which free virtual channels of links to the input port of said packet switching system are renewably allocated; and

means for searching, when a packet is to be sent out, said virtual channel and mode table for a virtual channel to a called party address and sending out a message packet through the virtual channel when the virtual channel is detected, and when the virtual channel is not detected, performing the signaling with the appropriate virtual channel identifier picked up from the free virtual channel identifier table and a

called party address on a signaling packet to said packet switching system;

said packet switching system including means for discriminating an output port in response to the called party address content of the received signaling packet, acquiring the free high speed mode virtual channel allocated to the output port and forwarding the signaling a packet, and then renewing the virtual channels table of the input and output ports.

#### Patentansprüche

1. Signalisierungsverfahren für die Verbindung/Trennung eines virtuellen Kanals (VC) in einem verbindungsorientierten Paketnetz, bei dem jedes Endgerät einen virtuellen Kanal zum Übertragen eines Pakets an eine Paketvermittlung übernimmt und die Paketvermittlung einen virtuellen Kanal mit einer der Anforderung auf Übertragung des Pakets entsprechenden Signalbandbreite verbindet sowie den VC-Identifizierer zum Endgerät entsprechend unterrichtet,

**gekennzeichnet durch die Schritte:**

Zuweisen einer Anzahl freier virtueller Kanäle (VC) für jeden Ausgangsport (521) als virtuelle Kanäle für den Hochgeschwindigkeitsbetrieb an einen Eingangsport (520) der Paketvermittlung (550) am Paketvermittlungssystem;

Zuweisen freier virtueller Kanäle zum Eingangsport des Paketvermittlungssystems an jedem Endgerät als virtueller Kanal für den

Hochgeschwindigkeitsbetrieb;

Auswählen eines virtuellen Kanals als Hochgeschwindigkeitskanal beim Versuch eines Endgeräts, ein Paket auszusenden, anstatt diesen vom Vermittlungssystem zu übernehmen, und Durchführen der Signalisierung mit der spezifischen virtuellen Kanalnummer des Hochgeschwindigkeitskanals und einer gerufenen Teilnehmeradresse (512) in einem Signalisierungspaket (510) zum Paketvermittlungssystem;

Unterscheiden eines Ausgangsports im Paketvermittlungssystem entsprechend der gerufenen Teilnehmeradresse des empfangenen Signalisierungspakets und Zuweisen eines entsprechenden virtuellen Kanals sowie Übermitteln des Pakets zum Ausgangsport; und anschließendes Aktualisieren der VC-Verhältnis-Tabelle zwischen den Ein- und Ausgangsports.

2. Signalisierungsverfahren für ein verbindungsorientiertes Paketnetz nach Anspruch 1, wobei die in das Signalisierungspaket einzubringende angerufene Teilnehmeradresse durch den Zielleitweg vom Ausgangs- bis zum Zielendgerät ersetzt ist durch abschnittsweise Leitweglenkung unter Benutzung der in der Signalisierung vom Endgerät enthaltenen Adresse eines angerufenen Teilnehmerendgeräts.

3. Signalisierungssystem für die Verbindung/Trennung eines virtuellen Kanals (VC) in einem verbindungsorientierten Paketnetz, bei dem jedes Endgerät einen virtuellen Kanal zum Übertragen eines Pakets an eine Paketvermittlung übernimmt und die Paketvermittlung einen virtuellen Kanal mit einer der Anforderung auf Übertragung des Pakets entsprechenden Signalbandbreite verbindet und den VC-Identifizierer zum Endgerät entsprechend unterrichtet,

dadurch gekennzeichnet dass, die Paketvermittlung aufweist:

eine Einrichtung zum erneuerungsfähigen Zuweisen gewisser freier virtueller Kanäle für jeden Ausgangsport als virtuelle Kanäle für den Hochgeschwindigkeitsbetrieb zu einem Eingangsport einer Paketvermittlung;

eine Tabelle (502) freier virtueller Kanäle in jedem Eingangsport für den Hochgeschwindigkeitsmodus, wobei die Ausgangsportnummer und die dem Ausgangsport zugewiesenen freien virtuellen Kanäle für das Signalisieren mit hoher Geschwindigkeit registriert werden;

eine Kopfteil-Übersetzer-Tabelle (552) zur Angabe von Modusinformationen dahingehend, ob die am Eingangsport des Paketvermittlungssystems empfangene Information einen schnellen oder normalen Signalisierungsmodus ausweist, von Informationen über einen



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VC-Identifizierer, einer Ausgangsportnummer sowie von Ausgangsportinformation als VC-Kennungs-Information der betreffenden Ausgangsportnummer; jedes Endgerät aufweist:

eine VC- und Moden-Tabelle (501), aus welcher gerufene Teilnehmeradressen und die den Adressen entsprechenden virtuellen Kanäle ersichtlich sind, die eine vorgegebene Zeit lang nach Ende der Übertragung durch einen virtuellen Kanal aufrechterhalten werden;

eine Tabelle (502) der als virtuelle Kanäle für den Hochgeschwindigkeitsbetrieb wählbaren freien virtuellen Kanäle, der freie virtuelle Kanäle für Verbindungen zum Eingangsport des Paketverbindungssystems erneuerungsfähig zugewiesen werden; und

eine Einrichtung zum Durchsuchen der VC- und Moden-Tabelle nach einer angerufenen Teilnehmeradresse, wenn ein Paket auszusenden ist, und Aussenden eines Meldungspakets durch den virtuellen Kanal, wenn dieser erfasst wird, sowie bei Nichterfassung des virtuellen Kanals zum Durchführen der Signalisierung mit dem entsprechenden VC-Identifizierer aus der Tabelle der freien virtuellen Kanäle und einer angerufenen Teilnehmeradresse in einem Signalisierungspaket zum Paketvermittlungssystem;

wobei das Paketvermittlungssystem eine Einrichtung zum Unterscheiden eines Ausgangsports als Antwort auf den gerufenen Teilnehmeradresseninhalt des empfangenen Signalisierungspakets, zur Übernahme des dem Ausgangsport zugeteilten freien virtuellen Kanals für den Hochgeschwindigkeitsbetrieb und zum Aussenden des Signalisierungspakets sowie Erneuern der Ein- und Ausgangsports aufweist.

## Revendications

1. Procédé de signalisation pour l'établissement/la suppression de connexions (VC) dans un réseau à commutation de paquets dans lequel chaque terminal acquiert un canal virtuel (VC) afin de transmettre un paquet à un système de commutation de paquets et ledit système de commutation de paquets établit un canal virtuel présentant une largeur de bande de signal correspondant à la requête de transmission du paquet et notifie l'identificateur du canal virtuel au terminal, ledit procédé de signalisation étant caractérisé par les étapes consistant :

à allouer, audit système de commutation de paquets, à un port d'entrée (520) dudit commutateur de paquets (550), un certain nombre de canaux virtuels libres (VC) pour chaque port de sortie (521) en tant que canaux virtuels en mode haute vitesse ;

à allouer, à chaque terminal, des canaux virtuels libres au port d'entrée dudit système de commutation de paquets en tant que canal virtuel en mode haute vitesse ;

à sélectionner, lorsqu'un terminal tente d'émettre un paquet, un canal virtuel appliqué en tant que canal virtuel en mode haute vitesse au lieu de l'acquérir à partir du système de commutation et à accomplir la signalisation avec le numéro spécifique de canal virtuel du canal virtuel en mode haute vitesse et une adresse de partie appelée (512) sur un paquet de signalisation (510) à destination dudit système de commutation de paquets ;

à distinguer, dans le système de commutation de paquets, un port de sortie en fonction de l'adresse de partie appelée du paquet de signalisation reçu, et à allouer un canal virtuel appropriée et à adresser le paquet au port de sortie ; et

ensuite, à renouveler la table relationnelle des canaux virtuels entre les ports d'entrée et de sortie.

2. Procédé de signalisation pour un réseau à commutation de paquets selon la revendication 1, dans lequel l'adresse de partie appelée devant être placée dans le paquet de signalisation est remplacée par le trajet de routage de source, qui indique le trajet du terminal source au terminal destinataire en accomplissant un routage bond par bond en utilisant l'adresse d'un terminal de partie appelé incluse dans la signalisation émanant du terminal.

3. système de signalisation pour l'établissement/la suppression de connexions (VC) sur un réseau à commutation de paquets, dans lequel chaque terminal acquiert un canal virtuel (VC) afin de transmettre un paquet à un système de commutation de paquets et ledit système de commutation de paquets établit un canal virtuel présentant une largeur de bande de signal correspondant à la requête de transmission du paquet et notifie l'identificateur de canal virtuel au terminal, le système de signalisation est caractérisé en ce qu'il comprend

ledit système de commutation de paquets incluant ;

des moyens destinés à allouer, de façon renouvelable, à un port d'entrée d'un système de commutation de paquets, certains canaux virtuels libres pour chaque port de sortie en tant que canaux virtuels en mode haute vitesse ;

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une table de canaux virtuels libres (502) qui existe sur chaque port d'entrée pour un mode haute vitesse dans lequel le numéro de port de sortie et les canaux virtuels libres alloués au port de sortie sont enregistrés pour la signalisation en mode haute vitesse ;

une table de convertisseur d'en-tête (552) destinée à indiquer les informations de mode représentatives du fait que les informations reçues au port d'entrée dudit système de commutation de paquets concernent, soit un mode haute vitesse, soit un mode de signalisation ordinaire, des informations représentatives d'un identificateur de canal virtuel, un numéro de port de sortie et des informations de port de sortie en tant qu'informations d'identificateur de canal virtuel au numéro de port de sortie ;

chaque terminal incluant ;

une table de canaux virtuels et de mode (501) indiquant les adresses de parties appelées, les canaux virtuels correspondant aux adresses et détenu pendant une période prédéterminée de temps après la fin de la transmission à travers le canal virtuel ;

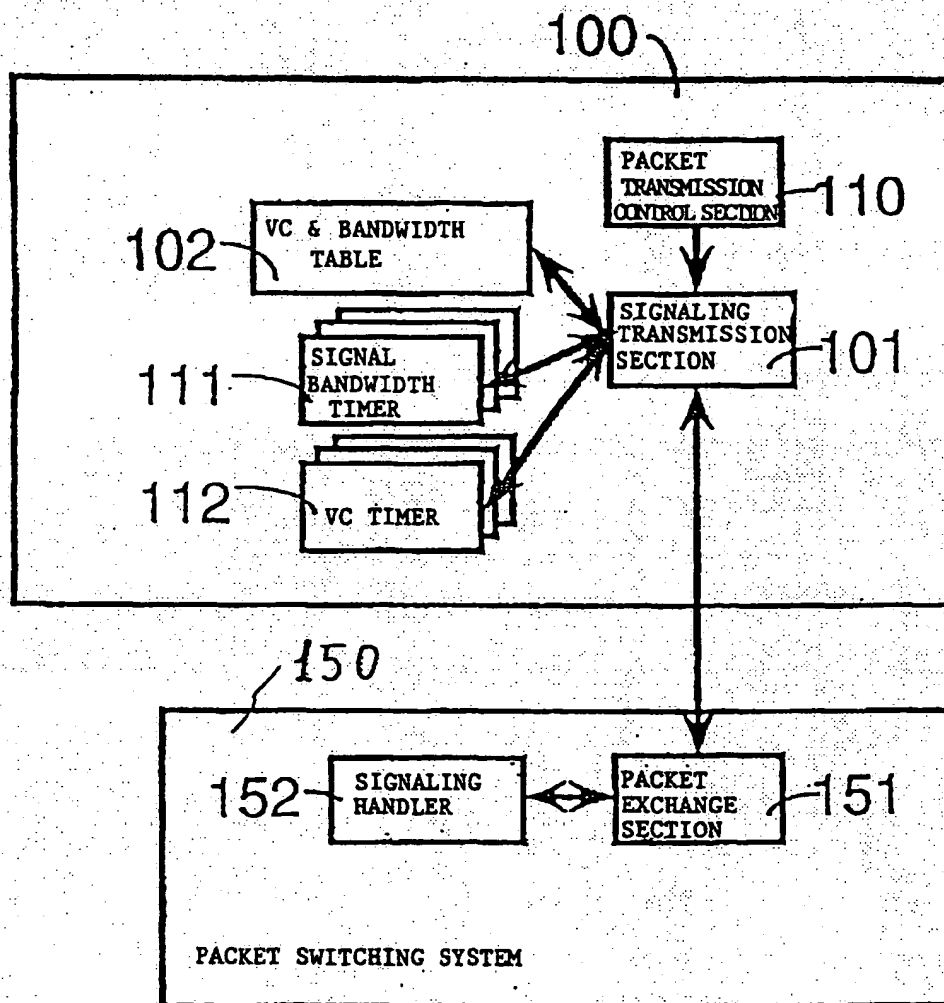
une table de canaux virtuels libres (502) pour un canal virtuel en mode haute vitesse dans laquelle les canaux virtuels libres des liaisons menant au port d'entrée dudit système de commutation de paquets sont alloués de façon renouvelable ; et

des moyens pour rechercher, lorsqu'un paquet doit être émis, à travers ladite table de canaux virtuels et de mode, un canal virtuel à une adresse de partie appelée et pour transmettre un paquet de message à travers le canal virtuel lorsque le canal virtuel est détecté, et lorsque le canal virtuel n'est pas détecté, pour accomplir la signalisation avec l'identificateur de canal virtuel approprié capté à partir de la table d'identificateurs de canaux virtuels libres et une adresse de partie appelée sur un paquet de signalisation à destination dudit système de commutation de paquets ;

ledit système de commutation de paquets incluant des moyens destinés à distinguer un port de sortie en réponse au contenu de l'adresse de partie appelée du paquet de signalisation reçu, à acquérir le canal virtuel en mode haute vitesse libre alloué au port de sortie et à adresser le paquet de signalisation, puis à renouveler le port d'entrée et le port de sortie.

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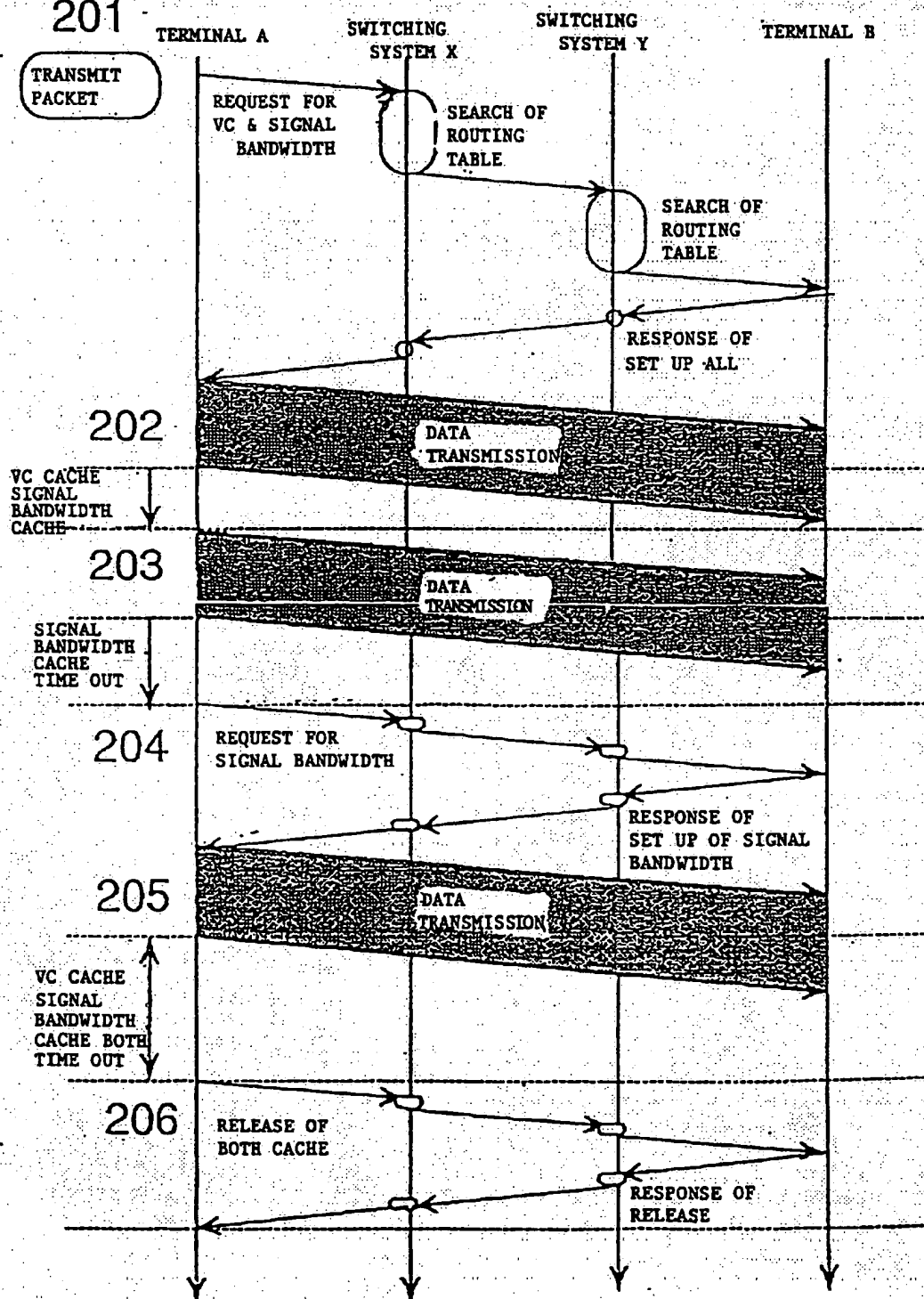
Fig. 1



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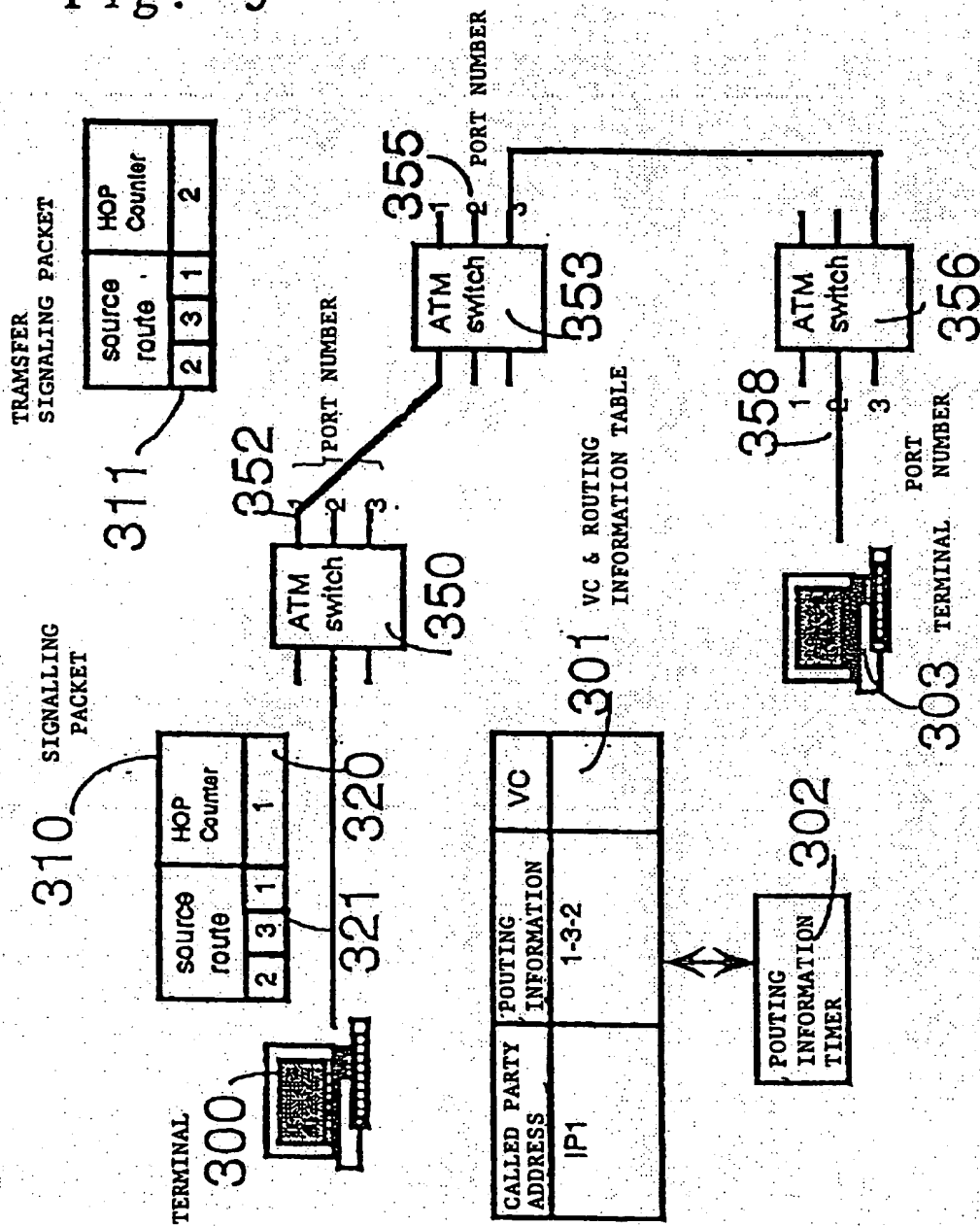
Fig. 2

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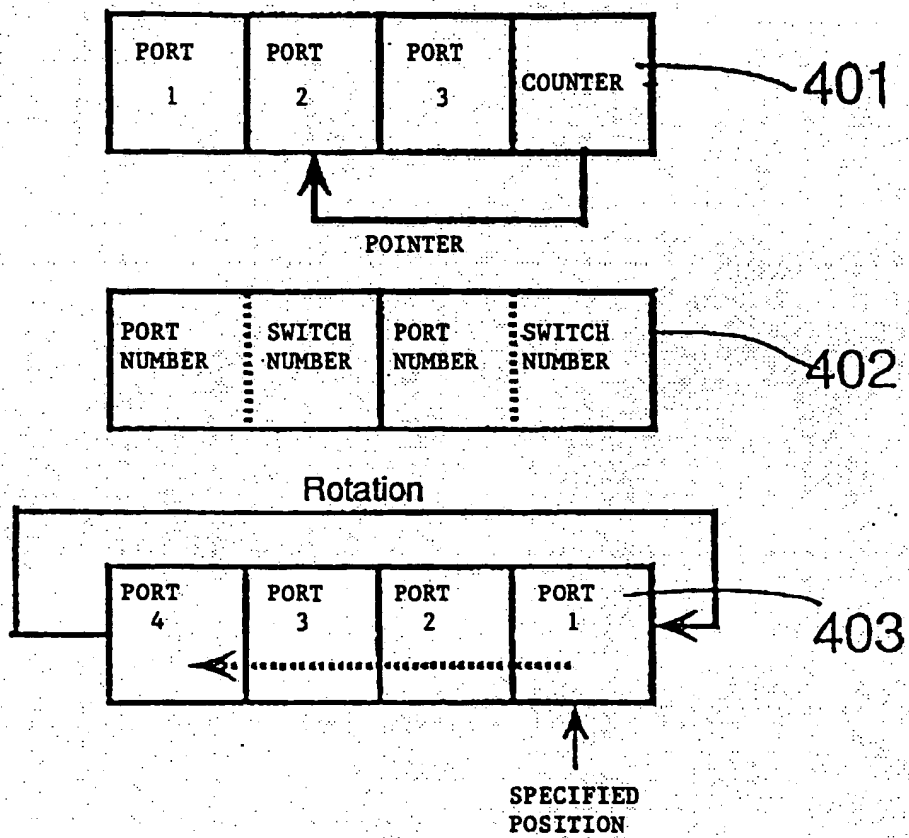
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Fig. 3



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Fig. 4



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Fig. 5

